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ABSTRACT

This study examines whether an analysis of characteristics of libraries or information centers and librarians in highly productive companies yields operational models and standards that can improve their efficiency and effectiveness and their parent organization's productivity. Data was collected using an e-mail survey instrument sent to 500 large software companies. Types of data collected for the library or information center included: number and placement of library or information center(s) within the organization; number and placement of librarian or information professional(s) within the organization; reporting structure for highest ranking library or information center staffer; staffing by category of work (professional, para-professional, clerical or technical), employee status (full, part-time or contractor/outsourced), and experience; staff professional development requirements; source of funding and allocation; services offered in the physical location; services offered in a virtual location; content purchased; measures of return on investment; ranked (by strategic value) customer segments; and ratio of staff to potential and actual customer base. Data collected for the librarian or information professional included: level of education; tenure at current organization; prior information industry experience; title; and professional development activities. A copy of the survey questionnaire is appended. (Contains 21 references.) (MES)

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# Characteristics of Information Agencies (libraries) and Information Agents (librarians) in Highly Productive Computer Software and Services Companies: The Key to Growth and Survival?

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## INTRODUCTION

The relationship between productivity and the existence of a library or information center and/or librarian or other information agents has been the topic of prior research across disciplines as diverse as economics, social sciences, engineering, as well as library and information science. Most of the research by library and information scientists on this topic was conducted between 1975 and 1995. A substantial portion of that research focuses on calculating the value of information and information services. Other studies approach the issue by exploring the impact of information services and information professionals on creativity and innovation, scientifically proven contributing factors to productivity.

In 1979 two things happened to change the focus of research. First, growth in United States (US) productivity, measured as US gross domestic production per employed person, hit an all-time low. Second, it became evident that traditional workforce productivity measures, formulated during the industrial age, fail in the information age. Today's workforce, largely a new class of professionals known as *knowledge workers,* spends a large amount of its time creating, using and communicating knowledge. Currently knowledge workers spend an average of 9.25 hours per week gathering and analyzing data (Strouse, 2001). Identifying techniques for improving productivity of knowledge workers becomes increasingly important since improving knowledge worker productivity should improve an organization's productivity. Subsequent development of econometric calculations dealing with the overall effect of information as a factor in industrial productivity yield consistent results from a variety of research studies (Koenig, 2000).

There are a number of ways in which productivity can be defined because of the many potential variables. Revenue per employee is a commonly used metric in the business sector, particularly the software/technology industry to measure profits, operational efficiency, growth and productivity (Hadley, 2002). It is one of the most important benchmarks used by companies to compare their performance to competitor and peers because companies with high revenue per employee ratios demonstrate a tendency to better utilize their workforce (Software Success, 2002). Revenue per employee is defined as the amount of total revenues from all sources

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divided by the average number of employees both full and full-time equivalent. Average number of employees is defined as all employees during the revenue period ("From the Middleton," 1997).

This study uses the following formula published by the Bureau of Labor Statistics (referred to in Bearman, Guynup & Milevski, 1985) to develop a "revenue per employee" number to serve as the criteria for productivity measure.

$$\text{Productivity (Revenue/employee)} = \frac{\text{Output (software/service revenue)}}{\text{Input (employees)}}$$

Where:

**Output** = Calendar year 2000 total worldwide software and service revenue
Source: Software Magazine 2001 Software 500 Methodology

**Input** = Calendar 2000 (year end) employees
Source: Software Magazine 2001 Software 500 Methodology

Information environment characteristics fostering productivity gradually emerge as research turns to user studies that focus on information seeking habits and information usage by workers. Studies by Koenig (1990) and Griffiths and King (1993) show that highly productive companies share information freely across the enterprise and their workers seek information from diverse external and internal sources. Researchers from a variety of disciplines, particularly those investigating creativity and innovation, report substantially the same results. Findings on the characteristics of productive information workers are consistent with and complementary to these information environment findings.

Unfortunately, there remains no consensus as to which services provided by libraries or information centers and librarians at highly productive companies make the greatest contribution. Lastly, there is no research into the impact of either internets or intranets on a library or librarian's contribution to productivity. Since it is known that libraries and librarians contribute to organizational productivity, then understanding characteristics of information agencies (libraries) and information agents (librarians) of highly productive companies should enable creation of an information environment that would support productivity improvements. Improved productivity will ensure viability of both the sponsoring organization and its library and librarians.

This study will seek to answer the question, "Will an analysis of characteristics of libraries or information centers and librarians in highly productive companies yield operational models and standards that can improve their efficiency and effectiveness and their parent organization's productivity?" If so, then models for optimum staffing, staff profiles, operational efficiencies, information products and tools, and information services best practices for software and services libraries and librarians can be developed in tandem with appropriate metrics and measurement techniques.

## REVIEW OF SELECTED LITERATURE

A number of studies examined the value and contribution of library and information centers, information professionals, and information content to company performance, health and success. Highly productive companies require a steady stream of actionable information to sustain a competitive advantage (Davidow & Malone, 1999). The more competitive the market place, the greater the information need, and the greater the investment in information services though there is evidence that companies consistently underinvest in information resources (Koenig, 1999).

Companies do differ in their ability to produce productivity gains from information resource investment. Industries considered information intensive such as financial services are more likely to improve their productivity than non-information intensive ones such as manufacturing (Harris & Katz, 1991). Internal and external factors affect a company's productivity gains. Internal factors may be top management's commitment, a company's prior experience and satisfaction with information investments, and company politics. External factors can include marketplace, a company's financial standing prior to the investment, and the company's size and ability to benefit from economies of scale (Olson & Weill, 1989).

Literature on the relation of libraries, library services and productivity is scattered among various disciplines. In the information and library science field, the earliest research focuses on the value of information. It either describes the concept of value and ways to measure it or describes the calculation of the value of information products and service using those measurements (Griffiths, 1982). The definition of productivity and its measurement are also considered because of the close relationship to measures for valuing information.

Value assessment from the user perspective was advanced by the work of King et al during a study on the value of the Energy Database (as referred to in Griffiths, 1982). Three views of user perspective valuation were defined: 1) *input perspective* or what users would pay for information and its products or services; 2) *process perspective* or how the use of information affects works; 3) *output perspective* or how work affects the environment as a whole.

Graham and Weil's 1975 Exxon Research Center study is considered the seminal work on valuing information services (Koenig, 2000). This study evaluated the benefit of the service provided *and* derived a value of information something that had never been done before. 62% of Exxon researchers reported that information events recorded over twenty randomly selected days were of benefit and 2% of the participants quantified that value. Graham and Weil were able to extrapolate an 11:1 ratio of benefits to cost of providing the information services. This study was followed by a similar but larger study at NASA in the late 1970s.

Both of these studies developed a cost/benefit ratio comparing the benefits likely to be saved or cost savings to product costs. Valuation methodologies of this type were most fully developed and widely applied by King Research in the late 1970s and 1980s. A comprehensive review of this research is available in Griffiths and King, (1993) Special Libraries: Increasing the Information Edge. The business and management literature also contains reviews of research

conducted on the relationship between information and productivity, but with a focus on the impact of information on innovation and research (Buderi, 1999).

Two factors led to a change in direction of research examining the relationship between information services and productivity in the late seventies. First, the growth rate of United States (US) domestic production per employed person hit an all-time low. Bearman et al. (1985) cite contributing factors for the decline such as aging industrial plants, a decline in research and development spending, growth of the service sector, the end of the shift from agriculture, an influx of inexperienced people into the workforce, and management attention to return on equity rather to productivity. Second, it became evident that traditional workforce productivity measures, formulated during the industrial age, and based on traditional production processes and techniques, failed in the information age.

The workforce is now comprised largely of a new class of professionals known as *knowledge workers*, a term first coined by Peter Drucker in 1959 (Drucker, 1994). Since knowledge workers spend a large amount of their time, 9.25 hours a week (Strouse, 2001) creating, using and communicating knowledge, improving knowledge workers' productivity should improve an organization's productivity.

Productivity is defined as "a concept that expresses the relationship between the quantity of goods and services produced—output, and the quantity of labor, capital, land, energy, and other resources that produced it--input" (Bearman et al. 1985, p. 371). Griffiths & King (1993), when referring to increased productivity, state, "this involves increasing profits" (p.28). Many variables affect productivity, such as economic performance, marketing and advertising, the customer base, and the number or diversity of business segments in a company. These factors and their effect will vary by company or industry. In this study the productivity measure of revenue per employee will be used to define highly productive companies.

Research and development (R&D) units have most often been the subject of studies examining information environments in productive corporations. Orphen's 1985 study (referred to in Koenig, 2000) reveals that productive organizations are populated with managers displaying the following behaviors:

- Literature and references were routed to scientific and technical staff
- Staff was directed to use scientific and technical information (STI) and to purchase STI services.
- Professional publication, networking, and continuing education of staff were encouraged

Koenig (1990, 2000) developed, as part of a study, a generalized list of characteristics of the more highly productive pharmaceutical companies. They are:

- Greater openness to outside information - Researchers attended more external meetings at which information was *exchanged*, they were encouraged to not only keep current in their field, but to see information beyond their current assignment, and professional activities were supported.

- Less concern with protecting proprietary information – Publication after a patent had been granted and published was encouraged, and the company was perceived as typical rather than well above average in concern for protecting proprietary information
- Greater information systems development effort - More time was spent developing more sophisticated information systems by library or information center staff.
- Greater end-user use of information systems and more encouragement of browsing and serendipity – The corporate research culture encourages researchers to spend time in the library or information center and to browse sources themselves.
- Greater technical and subject sophistication of the information services staff – Staff conducts the more complex technical and subject research while the researchers do the routine literature searches.
- Relative unobtrusiveness of managerial structure and status indicators in the Research & Development environment – There is an egalitarian culture.

Researchers from a variety of disciplines investigating creativity and innovation report substantially the same findings. Studies show that information access, contact with external information sources, and diversity of information sources are key factors to successful innovation. Utterback's (referred to by Koenig, 2000) review of management literature cites consistent communication as the primary contributing factor to innovation. Wolek and Griffith's (referred to by Koenig, 2000) review of sociology literature reaches the same conclusion. McConnell (referred to by Koenig, 2000) credits the flow of formal and informal information up, down and across the enterprise as the source for improvements in operational productivity. Kanter, after investigating innovations by middle managers, formulated recommendations for organizational support of creativity that included "a free and somewhat random flow of information" (referred to by Koenig, 2000, p. 91). She also asserts that a manager's needs are information, resources and support, in that order.

Research has developed a positive correlation between professional level employees' productivity and the amount of time spent reading. Koenig (1999) cites research by Mondschein, Ginman, King Research, Inc. and others to validate this theme of greater access to and use of information services by more productive individuals across all findings.

Knowledge workers consistently spend about 20-25% of their time to access and use information. Also, individuals intuitively cease information seeking after spending 20-25% of their time doing so because a) other work-related tasks have become more important and b) they perceive further effort will yield insufficient results to warrant more time expenditure. A lower percentage would indicate the desired information is found. Since this percentage remains constant across companies and industries, the correct information or all the required information required may not be consistently found. It makes sense for an employer to provide the most relevant information resources possible to increase effectiveness of employees information seeking.

Various approaches have been used to calculate the effect of information as a factor in industrial productivity. Hayes and Erickson (referred to in Koenig, 2000) used the Cobb-Douglas formula in 1982. Braunstein (referred to in Koenig, 2000) incorporated the constant

elasticity of substitution and the translog production functions into the Cobb-Douglas formula in 1985 to produce a consistent 2.34:1 ratio, e.g. each unit of information service input yields 2.34 units of output value. King Research, Inc.'s ratio of 2.2:1 for the Department of Energy's Energy Database and a 1.98:1 ratio for NASA's information services are very similar though they did not use the Cobb-Douglas formula in any form.

Matarazzo, Prusak and Gauthier in 1990 and Matarazzo and Prusak in 1995 conducted studies on the value senior executives placed on information centers and information professionals. They used a trend analysis technique to profile corporate libraries. Results reveal the value or impact of the library or information center increases when it is closely aligned with the more strategic pieces of the parent organization. A deep understanding of the parent's business and industry and market in which it operates is essential to delivering more complex services such as data analysis. Data analysis was cited as a primary example of a skill that could be developed to enhance the library or information center's contribution to its parent.

Other findings include greater end-user access to information which then requires increased training on selection and use of information resources; reduction in size or stagnant growth of library or information center staff, space requirements, and budgets; adoption by information professionals of a more proactive stance in delivering information. However, no determination was made as to which factors contribute most to corporate productivity (Matarazzo et al. 1999; Matarazzo and Prusak, 1999).

## METHODOLOGY

Unlike companies in the industrial age when hard assets represented value, software and service companies' value in the information age resides almost exclusively in intellectual assets. The extraordinary degree to which knowledge comprises software and services working capital, coupled with the fact that this industry has not been the focus of prior studies, makes them an ideal and interesting candidate for this study. "Because knowledge has become the single most important factor of production, managing intellectual assets has become the single most important task of business", Steward (1997, p. xiii).

The software and services companies listed in the Software Magazine's 2001 Software 500, serves as the survey population for this study. This list is published annually in the June/July issue, and is available electronically on the internet (Frye, 2002). Public and private companies selling business software and services across numerous diverse industries are ranked according to *total worldwide software and services revenue* for calendar year 2000. This figure is used by Software Magazine in determining rank rather than total corporate revenue because some companies have other lines of business. In calculating revenue per employee for purposes of this study, total corporate revenue was used since library and information centers and information professionals serve the entire company. *Software Magazine's* annual vendor survey, public documents, press releases, SEC filings, and industry analysts served as the source for the employee and financial information.

Data was collected using an email survey instrument. The survey could not be anonymous since data was correlated according to the productivity measure of revenue per employee ranking of respondent. To mitigate participant concern about release of competitive intelligence, individual responses are known only to the researchers. The findings are presented only in aggregate form with individual responses not attributed to any named person or company.

The survey was structured to identify companies that had libraries, librarians or information centers. Participants from companies without libraries, librarians or information centers were asked to identify content purchased and where the company got the content it used. Companies with libraries, librarians or information centers were asked twenty questions. Since the research objectives were to define characteristics of library or information centers and librarians, questions were aggregated into the following segments: General Information, the Parent Organization, the Information Staff, the Library or Information Center Organization and Company Return on Investment and Customers. Types of data collected include:

Library or Information Center -

- Number and placement of library or information center(s) within the organization
- Number and placement of librarian or information professional(s)within the organization
- Reporting structure for highest ranking library or information center staffer
- Staffing by category of work (professional, para-professional, clerical or technical), employee status (full, part-time or contractor/outsourced), and experience
- Staff professional development requirements
- Source of funding and allocation
- Services offered in the physical location
- Services offered in a virtual location
- Content purchased
- Measures of return on investment
- Ranked (by strategic value) customer segments
- Ratio of staff to potential and actual customer base

Librarian or Information Professional -

- Level of Education
- Tenure at current organization
- Prior information industry experience
- Title
- Professional development activities

The survey questionnaire was pre-tested by four Fortune 500 corporate information professionals in the Dallas/Ft. Worth metroplex area. These professionals have over 80 years of combined information industry experience. They offered a number of suggestions that contributed to the general organization of the survey. Recommendations included clarifying desired context of responses from the perspective of the individual or the company, categorizing multiple data points in single questions and structuring the survey so that participants without libraries, information centers or information professionals completed fewer questions.

An Access database of the 500 largest Software companies was constructed to include ranking, company name, contact name, title, telephone number, email address, mailing address, revenue, headcount and revenue per employee. Since the primary goal of this research is to profile librarians and existing library or information center operations, surveys were sent to the library or information center director or manager in a firm. Library professionals would be most knowledgeable and would be more likely to respond to the survey. Company contact names were developed using the Special Libraries Association Who's Who member directory and the Directory of Special Libraries and Information Centers. If no library professional could be identified, surveys were sent to administrators or officers of a companies who held the position of chief intelligence officer (CIO), chief technology officer (CTO), chief knowledge officer (CKO), or marketing manager.

All survey respondents were asked to provide title and area of responsibility. Participants from companies with a library or information center or information professionals (defined as individuals with Masters of Library Science, Masters of Information Science or Masters of Library and Information Science) were immediately redirected to the Parent Organization section which begins the principle twenty-question survey. Participants with no library or information center or librarians were asked to describe the information content used by their company and how they retrieve that information.

A total of 500 emails were sent. Each email contained a brief introduction of the investigator, the purpose and scope of the research, and the survey. To ensure identification of the source of a response, each survey carried the recipient's Software 500 rank number. Surveys were not sent to organizations if a contact was not identified. A number of surveys were returned as undeliverable for a variety of reasons. Attempts were made to identify an alternative contact and, if successful, the survey was resent. A "second request" was sent to recipients with valid addresses who had not responded within five days. The initial analysis of the survey responses found a total of 25 surveys have been returned to date of which 23 were usable for a 4.6% response rate. Corrected names, titles, and email addresses are being compiled for emails from the initial mailing that were returned as undeliverable. Final results will be reported at the 2002 Special Libraries Annual Conference in Los Angeles, Calif.

## RESULTS AND DISCUSSION

### Preliminary Findings

Analysis of the responses from the first mailing yield interesting findings concerning companies with formal libraries or information centers and those without a traditional library or information canter. Of the twenty-three respondents to the survey, fifteen of the software companies reported they have no library or information center. Fourteen of these responding companies do not employ a librarian or information professional with a master's degree in library or information science. One company did state that while there is no physical library or information center, there is an enterprise information resource that includes some of the materials typically found in a library. They also employ an individual to assist employees with their information needs.

The information content used and purchased by software and services companies with and without libraries or information centers was very similar. Table 1 presents a listing of the content identified by both groups. Over three-fourths of both groups of respondents cited business and management resources, director.es, journals and magazines, market research reports and online services. Software and services companies *without* libraries, information centers, or information professionals, also responded that they purchased software (81.3%). The responding companies *with* a library also purchase Wall Street Analyst reports and benchmarking studies.

Table 1.

Content Use By Companies With And Without Libraries Or Information Centers

| Type of Content | | Organizations w/no Library | Organizations w/ a Library |
|---|---|---|---|
| Analyst (Wall Street) Reports | YES | 68.8 | 85.7 |
| | NO | 31.3 | 14.3 |
| Benchmarking Studies | YES | 37.5 | 71.4 |
| | NO | 62.5 | 28.6 |
| Business/Management Resources | YES | 81.3 | 85.7 |
| | NO | 18.0 | 14.3 |
| Books/CDs/DVDs | YES | 68.8 | 71.4 |
| | NO | 31.3 | 28.6 |
| Conference Proceedings | YES | 56.3 | 57.1 |
| | NO | 43.8 | 42.9 |
| Directories | YES | 75.0 | 85.7 |
| | NO | 25.0 | 14.3 |
| Documentation | YES | 50.0 | 42.9 |
| | NO | 50.0 | 57.1 |
| e-Based Subscriptions (such as eZines) | YES | 56.3 | 71.4 |
| | NO | 43.8 | 28.6 |
| Journals/Magazines | YES | 93.8 | 85.7 |
| | NO | 6.3 | 14.3 |
| Market Research Reports | YES | 87.5 | 100.0 |
| | NO | 12.5 | 00.0 |

| | | | |
|---|---|---|---|
| Newspapers | YES | 56.3 | 85.7 |
| | NO | 43.8 | 14.3 |
| Online Services (e.g. Dow Jones, Bloomberg) | YES | 75.0 | 85.7 |
| | NO | 25.0 | 14.3 |
| Software | YES | 81.3 | 42.9 |
| | NO | 18.8 | 57.1 |
| Standards | YES | 31.3 | 42.9 |
| | NO | 68.8 | 57.1 |
| Technical Reports or White Papers | YES | 75.0 | 57.1 |
| | NO | 25.0 | 42.9 |
| Technical Certification Practice Exams | YES | 18.8 | 28.6 |
| | NO | 81.3 | 71.4 |

The software and services companies *without* a library or formal information provider find and retrieve their information from the internet (82.4%), market research companies (88.2%), professional or industry associations (88.2), and from e-based content vendors (70.6%). Although they do not have a traditional corporate library or information center or a trained librarian, these companies are able to meet their information needs. Much of the critical information content used in the software business is available on the Internet, through online vendors, and through other digital technologies. A great deal of this information is available instantaneously through digital transmission.

It is interesting that only slightly more than one-half of these companies use a formalized information system or intermediary such as a consultant (62.5%) or information broker (52.9%). Online access to new and more sophisticated information technologies, the internet, databases, and other digitally published resources is advantageous for an organization without a library or information intermediary, enabling them to meet the business information needs of these users.

Table 2

Where do organizations without libraries get information content?

| Content Organizations (n = 17 ) | Yes | No |
|---|---|---|
| Consultants | 62.5 | 37.5 |
| e-Based Online Content Vendors (e.g., Dunn & Bradstreet, Dow Jones, etc.) | 70.6 | 29.4 |
| Information Broker or Independent Researcher/Research Firm | 52.9 | 47.1 |
| Internet | 82.4 | 17.6 |
| Market Research Companies (e.g., Gartner, IDC, Giga) | 88.2 | 11.8 |
| Professional or Industry Association | 88.2 | 11.8 |
| Standards Organization | 52.9 | 47.1 |

Preliminary findings from the survey show that 30.4% of the responding twenty-three companies have a library or information center. Five of the seven libraries noted that their senior information professional reports to administrators in the marketing departments of their companies. Little has changed in this aspect of a library or information center manager's reporting structure. Only three out of one hundred sixty-four librarians participating in a 1990 survey reported to someone with a library or information center background. (Matarazzo et al., 1999). Almost half (42.9%) of the library and information centers are funded as part of the operations budget of the company, while two (28.6%) are considered corporate overhead.

Respondents from companies with libraries or information centers report offering many services to their customers. Table 3 lists services cited. The majority of noted services provide access to information resources or content such as company information (85.7%), journals and newspapers (71.4%), information services such as conducting business or corporate intelligence research (71.4%), researching special projects (71.4), or providing instruction on use of information resources (71.4). As a result of the introduction of digital information technologies and web-based information resources, the information professional's role as intermediary has become more important. Training users on information tools and their use has become an important service. Information professionals now find themselves playing the role of facilitator and trainer as opposed to the past emphasis of information provider. (Strouse, et al, 2001) The librarians also report providing more in depth research services, including primary research and quantitative analysis as a result of more accessibility to information resources through online technologies.

Services offered by a librarian, library or information centers were most valuable to company executives and to employees in the marketing, consulting, and sales departments. Products and services most requested were market analyst research, financial reports or company information and competitor tracking.

Table 3

Services Offered By The Library Or Information Center

| Services | Percentage |
|---|---|
| Circulation – Content | |
| Journals | 71.4 |
| Newspapers | 71.4 |
| Content Management | |
| Develop and/or manage internally developed databases such as technical reports or training materials | 57.1 |
| Manage journal subscription for the library or information center | 57.1 |
| Purchase content held or managed by the library or information center | 57.1 |
| Reference / Research | |
| Conduct business or competitive intelligence to support strategic/tactical decision making | 71.4 |
| Company information – public and private – national and international | 85.7 |
| Maintain general overall awareness (e.g. market conditions, customer needs, etc.) | 71.4 |
| On demand research including searching online databases, the Internet or other specialized resources | 71.4 |
| Research to support special project assignments such as competitive reviews | 71.4 |
| Targeted news services (selective dissemination of information) that distributes or circulates (electronically or in hard copy) articles, market research or other focused content | 71.4 |
| Ready reference | 71.4 |
| Services | |
| Reading Room | 57.1 |

| | |
|---|---|
| Technology / Tools | |
| Develop and/or maintain an information portal on the organization's intranet | 57.1 |
| Training | |
| General instruction on selection and use of appropriate library or information center managed information resources | 71.4 |
| Instruction on use of targeted resources for specific end results (e.g., use of market research to build on competitive advantage) | 57.1 |

The companies with libraries do report participation in the development and maintenance of their firm's intranet. Developing, creating, and managing information content for the company intranet allows information professionals to bring information closer to the point of need of users. With intranet access more relevant information is delivered to company users at their convenience, which potentially can be 24 hours a day, seven days of the week 365 days a year. Access to information on the intranet makes resources accessible to formerly underserved and remote users.

Table 4 lists services or content that these libraries offer on the company intranet.

Table 4

Information Services Or Content On The Library Or Information Center Intranet

| Services or Content | |
|---|---|
| Access to external information databases (e.g. Factiva.com) | 85.7 |
| Analyst (Wall Street) Reports | 57.1 |
| Company/Industry information (companies outside of organization) | 71.4 |
| Links or pointers to selected Internet sites | 71.4 |
| Links or pointers to other internal intranet sites (e.g. product group sites) | 71.4 |
| Market research reports | 71.4 |
| Reference or research request forms | 71.4 |
| Topic pages aggregating resources for a specific audience | 71.4 |

Information and services accessible from the company intranet include access to external information databases, company and industry information, links to other internet and intranet sites, and market research reports. The intranet also serves as a two-way communication link with the library or information center's customers. 71.4% of the respondents report a form to request research is also accessible from their firm's intranet.

Preliminary findings reported in Table 5 indicate that demonstrating return on investment (ROI) continues to be a challenge for libraries and information centers. The measurement of ROI is something that corporate executive use to determine the value of any business segment to the organization. Demonstrating ROI allows information center customers and corporate management to understand the benefits received from the corporate library or information centers staff, resources, and services. Respondents most frequently (71.4%) report a traditional measure, collecting and reporting customer and staff interactions, to upper management to demonstrate return on investment to upper management. While this metric demonstrates usage, it does not serve as an indicator of the *value* of library or information center services. Other traditional measures used somewhat frequently (42.9%), are customer circulation statistics and savings from consolidated purchasing. User time saved, which can be converted to a dollar savings to illustrate a bottom line contribution, are also used only somewhat frequently (42.9%) while a measure with great impact, sales attributed to library services, is used infrequently (28.6%).

Table 5

How Libraries Demonstrate Return On Investment To Upper Management

| ROI Data | Yes | No |
|---|---|---|
| Organizations (n=7) | | |
| Customer circulation statistics | 42.9 | 57.1 |
| Customer & staff interactions | 71.4 | 28.6 |
| Sales attributed to library services | 28.6 | 71.4 |
| Savings in consolidated buying | 42.9 | 57.1 |
| User time saved | 42.9 | 57.1 |
| Other (Intranet usage & customer Satisfaction survey) | 8.7 | 82.6 |

# SUMMARY, MAJOR FINDINGS, AND RECOMMENDATIONS FOR FURTHER RESEARCH

## Summary

A body of research across several disciplines firmly establishes a relationship between corporate productivity and information services. Access to information and the flow of information positively impacts productivity, even though most corporations historically underinvest in their information environment.

The more egalitarian the culture, the greater the sharing of information and knowledge. In fact, emphasizing the proprietary nature of information tends to be counterproductive. This is especially true in more information-intensive industries.

A review of the characteristics of knowledge workers tells us that the way to increase their productivity is to increase the effectiveness of their information and knowledge seeking. Also, the degree to which information systems are used directly correlates with organizational productivity.

Little recent research has been done on the relationship of productivity and libraries and librarians, and nothing of consequence since the rise of the World Wide Web (WWW) and intranets. Preliminary findings from this study do not reveal specific services unique to highly productive companies. They do show that new technologies such as the internet, the prevalence of sophisticated information systems, and the ready availability of the information needed by software and services company employees in e-format have enabled direct access to the information required in software and services companies.

Larger companies with higher revenue per employee rates are making the investment in formal information services organizations but smaller companies can produce high revenue per employee rates without formal information services. Information professionals in company libraries are utilizing their company's intranet to deliver resources and to communicate with their customers.

> "The only irreplaceable capital an organization possesses is the knowledge and ability of its people. The productivity of that capital depends on how effectively people share their competence with those who can use it."
>
> Andrew Carnegie
> Source: Stewart (1997 p. 128)

## Recommendations for Further Research

Based on preliminary findings, an alternative measure of productivity, profit per employee, should be the measure of productivity in future studies to account for the wide range of the variable, number of employees. Median revenue per employee among private software

firms under $25 million revenue is $108,173 vs. $207,290 for the top eleven software companies, a 92% difference (Hadley, 2002). Yet a comparison of the under $25 million firms' profit per employee of $7,979 to the $9,009 profit per employee of the top eleven software companies produces only a 13% delta. The profit per employee would produce a more succinct peer to peer company comparison.

Reproduction of this study in a second information intensive industry segment such as the legal profession could produce additional data. The data could be compared to, and possibly aggregated with, the software and services industry data to develop operational models and optimum services that would yield the greatest productivity gains for companies.

Final recommendations will be presented at the 2002 Special Libraries Association Annual Conference in Los Angeles, California.

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## APPENDIX A – SURVEY QUESTIONNAIRE

***INTRODUCTION***

My name is Margaret Carroll and I am a student in the Interdisciplinary Ph.D. Program in Information Science at the University of North Texas.

My research interest is the contribution information centers, libraries, and information professionals make to their organization's productivity. Objective of this survey is to construct profiles of these categories of information resources in Software Magazine's 2001 Software 500. It forms the basis of deeper research which will ultimately focus on causality factors influencing degree of contribution to productivity. Research in these areas could be used to develop staffing and resource allocation guidelines, services selection, and return on investment models.

While this survey is not anonymous to the researcher, findings will be presented in **aggregate form only** with individual responses not attributed to any named individual or organization. If you complete this survey, you are implying consent for the information to be used in aggregate form. You are free to withdraw your consent and cease participation at any time. Participants will receive a blind partner summary of findings.

If you have any questions you may contact me via email (mc0010@unt.edu) or by phone 817-797-3919. You can also ask questions of my faculty advisor, Dr. Yvonne Chandler, via email to chandler.lis.admin@unt.edu.

***Submit the completed survey via email to mc0010@unt.edu.*** *Reply within 1week of receipt of the survey* would greatly facilitate this project. Your contribution to this research is very much appreciated.

---

***General Information (001):***
What is your title and area of responsibility?

| Name/Title: | Primary area of responsibility: |
|---|---|
| | |

Does your organization have a Library or Information Center?

| | |
|---|---|
| Yes: | Don't know: |
| No: | Other (specify):<br>**(Skip to Part A: Question #1** – you may forward survey to library info. Ctr. Director to complete.) |

Does your organization have information professionals, individuals with Masters of Library Science, Masters of Information Science, or Masters of Library and Information Science, performing duties usually associated with librarians or research analysts?

| | |
|---|---|
| Yes: | Don't know: |
| No: | Other (specify):<br>**(Skip to Part A: Question #1** – you may forward survey to library info. Ctr. Director to complete.) |

What kind of content is purchased by your organization? **Check all that apply.**

| | **Sources** | | **Sources** |
|---|---|---|---|
| | Analyst (Wall St.) Reports | | Online services (e.g. D & B, Dow Jones Interactive, NewsEdge, Lexis-Nexis) |
| | Benchmarking studies | | Software |
| | Business / Management resources | | Standards |
| | Books / CDs / DVDs | | Journals / Magazines |
| | Conference Proceedings | | Market Research Reports |
| | Directories | | Newspapers |
| | Documentation | | Technical Reports or White Papers |
| | e-based subscriptions such as eZines | | Technical certification practice exams |
| Other (specify): | | | |

Where does your organization get the content it uses? **Check all that apply.**

| | | | |
|---|---|---|---|
| | Author | | Internet |
| | Bookstore | | Market Research Co (e.g. Gartner, IDC) |
| | Colleagues outside of your organization | | Professional Associations |
| | Consultants | | Standards Organizations |
| | ebased Online Content vendor (e.g., D & B, Dow Jones, etc.) | | Subscription Service(s) |
| | Governmental or Municipal Agency or Government Publishing Office | | Training vendors |
| | Information Broker or Independent Researcher / Research firm | | Other (specify): |

**END OF SURVEY UNLESS YOU HAVE BEEN RE-DIRECTED TO QUESTION #1.**

**Thank you for your participation!**

---

***Part A: The Parent Organization***

1) Indicate library or information center location(s) in the organization's hierarchy:

| **Your** library or information center's Location in the | **No. and location** of **other** libraries &/or information centers in | Organization unit to which a library or information center reports |
|---|---|---|

| organization | the organization | |
|---|---|---|
| | | Corporate Support Services |
| | | Consulting / Professional Services |
| | | Education and Training |
| | | IT / IS (technology) group |
| | | Legal / Regulatory Compliance |
| | | Library / Information Center |
| | | Planning – Business Group |
| | | Planning – Corporate Group |
| | | Planning – Division Group |
| | | Research & Development / Technology |
| | | Sales / Marketing |
| | | Sales / Business Development |
| | | Other (specify): |

2) If you are not located in the library or information center, indicate your location in the organization.

| **Your** location in the organization | Organization unit to which **YOU** report |
|---|---|
| | Competitor Intelligence |
| | Corporate Support Services |
| | Consulting / Professional Services |
| | Education and Training |
| | IT / IS (technology) group |
| | Legal / Regulatory Compliance |
| | Library / Information Center |
| | Planning – Business Group |
| | Planning – Corporate Group |
| | Planning – Division Group |
| | Research & Development / Technology |
| | Sales / Marketing |
| | Sales / Business Development |
| | Other (specify): |

3) Indicate no. and location in organization of any information center **staff** not house in the library or information center?

| ***Number of Professional or Technical*** | ***No. of Para-professional or clerical*** | ***Location of staff*** |
|---|---|---|
| | | Competitor Intelligence |
| | | Corporate Support Services |
| | | Consulting / Professional Services |

| | | |
|---|---|---|
| | | Education and Training |
| | | IT / IS (technology) group |
| | | Legal / Regulatory Compliance |
| | | Library / Information Center |
| | | Planning – Business Group |
| | | Planning – Corporate Group |
| | | Planning – Division Group |
| | | Research & Development / Technology |
| | | Sales / Marketing |
| | | Sales / Business Development |
| Other (specify): | | |

4) To whom does the highest-ranking information center or library center staff person report?

| Title: | Primary area of responsibility: |
|---|---|
| | |

***Part B: The Information Staff***
***(If known, answer for <u>all</u> libraries or information centers in the organization.)***

5) List the ***number of library or information center(s) staff*** next to the category that best describes the primary tasks on which the majority of their time is spent. Count an employee only once.

| **Employees Categories** | **# of Full Time** | **# of Pt. Time** | **Contractors / Outsource Personnel** |
|---|---|---|---|
| **Information Professional(s) - IP** (Performing duties usually assigned to individuals with an MLS, MIS, MLIS, MBA Degree or equivalent experience) | | | |
| **Para-professional(s) - PP** (Performing duties usually assigned to individuals with a Bachelors degree, a specialized information skill such as acquisitions or circulation or 1+ years information center experience) | | | |
| **Clerical - C** (Performing duties usually assigned to individuals with no degree or IS experience) | | | |
| **Technical - T** (Primarily performing duties involving software development / intranet or web work or database administration involving hardware or networks) | | | |

6) What ***library or information center experience does your staff have?*** Account for employees in the same category assigned in question #5 by placing them in the number of years experience range. **Count an employee only once.**

| **Experience in *your* organization** | **<1 year** | **1-3 years** | **4-5 years** | **6-10 years** | **11-15 years** | **15+ years** |
|---|---|---|---|---|---|---|
| Information Professionals - **IP** | | | | | | |
| Para-professionals - **PP** | | | | | | |
| Clerical - **C** | | | | | | |
| Technical - **T** | | | | | | |

| ***Previous* experience in library or information center** | **<1 year** | **1-3 years** | **4-5 years** | **6-10 years** | **11-15 years** | **15+ years** |
|---|---|---|---|---|---|---|
| Information Professionals - **IP** | | | | | | |
| Para-professionals - **PP** | | | | | | |
| Clerical - **C** | | | | | | |
| Technical - **T** | | | | | | |

7) What are the job titles of the IS staff? Note number of staff holding each title, counting an employee only once. Categorize each title selected as IP, PP, C or T as listed in question #5.

| ***Title*** | ***# of staff*** | ***Segment*** | ***Title*** | ***# of staff*** | ***Segment*** |
|---|---|---|---|---|---|
| Administrator | | | Library Assistant | | |
| Analyst | | | Library Technician | | |
| Assistant | | | Manager or Supervisor | | |
| Cataloger | | | Programmer | | |
| Clerk | | | Project Manager | | |
| Consultant | | | Reference | | |
| Content Manager | | | Researcher | | |
| Database Administrator | | | Supervisor | | |
| Director | | | Systems Librarian | | |
| Editor | | | Team Lead | | |
| Knowledge Architect | | | Web Master / Editor | | |
| Knowledge Manager | | | Web Designer | | |
| Other (specify): | | | | | |

8) What is the IS staff's educational background? Note number of staff next to highest level they have achieved. **Count each employee only once.**

| | *Associates Degree* | *Bachelors Degree* | *Masters* | *2nd Masters* | *Ph.D.* | *Other* |
|---|---|---|---|---|---|---|
| Information Professionals - **IP** | | | | | | |
| Para-professionals - **PP** | | | | | | |
| Clerical - **C** | | | | | | |
| Technical - **T** | | | | | | |

9) Do you require a 2nd subject specific Masters for **ANY** information center staff position?

| | |
|---|---|
| ____yes | Subject(s): |
| ____ no | ___ don't know |

10) Does your organization have a minimum number of training hours information center staff must complete annually for professional development?

| | |
|---|---|
| ____ yes | Numbers of hours: |
| ____ no | ___ don't know |

11) How does the staff obtain professional development training? (Check all that apply.)

__ Conference attendance
__ Continuing education classes at a college or university
__ Continuing education classes sponsored by a Professional Assn
__ In-house training classes
__ Tuition reimbursement for coursework leading to a degree
__ Vendor instruction
__ Other (specify): _____
__ Do not know: _____

***Part C: The Library or Information Center Organization***
***(If known, answer for all libraries and information centers in the organization.)***

12) How is the library or information center function funded? (Check all that apply.)

_____ Allocation to departments based on a formula

_____Allocation to departments based on usage
_____As part of the operations budget of its owning unit
_____Costs are covered through charge backs - (____ % if less than 100%)
_____Library or information center budget is funded as corporate overhead
_____Per charge head across the enterprise
_____Other (specify): _____

13) Can you provide a dollar range representing the organization's total library or information center budget?

| |
|---|
| Estimate: |
| Don't know: |

14) List budget allocation **percentage to total 100%**:

| Percentage | Allocation |
|---|---|
| | Depreciation |
| | Equipment / Hardware / Software |
| | Information Resource acquisitions (e.g. books, serials, videos, CDs, software) |
| | Online Information Resource Acquisition<br>Accessible only by IS Staff (e.g. Dialog, LexisNexis) |
| | Online Information Resource Acquisition<br>Accessible across the enterprise (e.g. Factiva.com) |
| | Operational overhead (facilities, etc) |
| | Rewards / Recognition / Morale |
| | Staff salaries & Benefits |
| | Professional Development (e.g. Association memberships, training) |
| | Travel |
| | Other (specify): |

15) What services are offered by ***all of your organization's*** library or information centers or by information professionals based in other areas of your organization? **Check *all* that apply.**

| |
|---|
| **Circulation - Content**: Audios/Videos/DVDs___ Books ____CDs ____ Conference Proceedings ____ Journals____ Market Research ____ Newspapers____ Patents ____ Software____ Standards____<br>Other (specify): |
| **Circulation – Hardware:** PC ___ Digital Camera ____ Scanner____ TV ____ VCR/DVD players _____ Other (specify): |
| **Content Management:**<br>____Evaluation<br>____Develop and/or manage internally developed databases such as technical reports or training materials<br>____Negotiate/enforce electronic licensing contracts<br>____Manage journal subscriptions for the library or information center |

| |
|---|
| ____Manage journal subscriptions for customers<br>____Manage market research and analyst relations<br>____Purchase content housed in or managed by the library or information center<br>____Purchase content housed in or managed by an organizational customer group |
| **Knowledge Management:**<br>____Knowledge architecture consulting (e.g. search structure strategies, taxonomy or meta-data/thesaurus development)<br>____Integrate internal and external content databases<br>____Manage internally generated proprietary content<br>____Other knowledge management initiatives (specify) _____ |
| **Records Management:**<br>____Archives<br>____Engineering notebooks or other technical logs or maps<br>____Manage an organizational museum<br>____Capture oral histories<br>____Preservation<br>____Records access, storage and retention |
| **Reference / Research:**<br>____Business or Competitive Intelligence to support strategic/tactical decision making<br>____Company information – Public and private – national and international<br>____Data analysis as part of a research deliverable<br>____Maintain general overall awareness (e.g., market conditions, customer needs, etc.)<br>____On demand research including searching online databases, the internet or other specialized resources<br>____Patent research and analysis<br>____Research to support special project assignments such as competitive reviews<br>____Targeted news services (selective dissemination of information) that distributes or circulates (electronically or in hard copy) articles, market research or other focused content<br>____Ready reference<br>____Other (specify): |
| **Miscellaneous Services:**<br>____Book club with regular discussion sessions (technical ____ or business____)<br>____PC access<br>____Photocopier / printer<br>____Proctor exams (e.g. technical certifications, university qualifying exams, etc.)<br>____Site or branch libraries with highly target collections in strategic locations<br>____Study carrels<br>____TV / VCR |
| **Technical Services:**<br>____Accept donations or gifts<br>____Cataloging / classification of collection<br>____Document delivery<br>____Inter-library loan<br>____Journal/Serials management<br>____Standing order management |

| |
|---|
| **Technology/Tools:**<br>____Develop and/or maintain an information portal on the organization's *intranet*<br>____Develop and/or maintain the organization's *internet*<br>____Develop and/or maintain access to external databases<br>____Develop and/or maintain the library or information center's administration system (e.g. online catalog) |
| **User Training:**<br>____General instruction on selection and use of appropriate library or information center managed information resources<br>____ Instruction on use of the Online catalog<br>____Instruction on use of targeted resources for specific end results (e.g. use of market research to build competitive advantage) |
| Other (specify): |

16) What information services or content is offered on the library or information center's ***INTRANET*** portal? **Check all that apply.**

| | ***Content or Service*** |
|---|---|
| | Access to external information databases (e.g. Factiva.com) |
| | Analyst (Wall St.) Reports |
| | Company / Industry information (companies outside of organization) |
| | Document delivery request |
| | Documentation / standards |
| | eZines / eBooks |
| | Links or pointers to selected ***internet*** sites |
| | Links or pointers to other internal ***intranet*** sites (e.g. product group sites) |
| | Market Research Reports |
| | Online catalog of library or information center holdings |
| | Online training on selection and use of information resources |
| | Reference or research request |
| | Targeted new services (Selective Dissemination of Information) |
| | Topic pages aggregating resources for a specific audience |
| | Other (specify): |

17) What kind of content is purchased by your organization? **Check all that apply.**

| | **Sources** | | **Sources** |
|---|---|---|---|
| | Analyst (Wall St.) Reports | | Online services (e.g. D & B, Dow Jones Interactive, NewsEdge, Lexis-Nexis) |
| | Benchmarking studies | | Software |
| | Business / Management resources | | Standards |
| | Books / CDs / DVDs | | Journals / Magazines |
| | Conference Proceedings | | Market Research Reports |

| | | | |
|---|---|---|---|
| | Directories | | Newspapers |
| | Documentation | | Technical Reports or White Papers |
| | e-based subscriptions such as eZines | | Technical certification practice exams |

***Part D: Company Return on Investment and Customers***

18) Rank the strategic value to the parent organization of library or information center services major customer groups with **one (1) being most important**. Which service(s) does each use most frequently?

| **Group / Unit** | **Ranking** | **Service(s) most frequently used** |
|---|---|---|
| Company Executives | | |
| Sales | | |
| Consulting | | |
| Manufacturing | | |
| Human Resources | | |
| Manufacturing | | |
| Operations | | |
| R & D | | |
| Product Development | | |
| Finance | | |
| Operations | | |
| Product Support | | |
| Legal | | |
| Training / Education | | |
| Marketing | | |
| Public / Investor Relations | | |
| Other (specify): | | |

19) What is the ratio of library or information center staff to customers?

| | |
|---|---|
| Number of actual customers vs. staff: | |
| Number of potential customers vs. staff: | |
| Don't know: | |

20) What data do you collect to illustrate return on investment to upper management?

____Customer circulation statistics
____Customer testimonials as to library and/or information center contributions
____Direct savings attributed to library and/or information center contributions
____Sales attributed to library and/or information center services or deliverables
____Savings in consolidated buying
____User time saved
____Other (specify): _____

Comments:

---------- **END OF SURVEY** ----------

Thank you for your participation!

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**U.S. Department of Education**
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